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Designing a Chatbot for Thessaloniki

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SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in E-Business and Digital Marketing

JANUARY 2020

THESSALONIKI – GREECE



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Abstract

This dissertation was written as a part of the MSc in e-Business and Digital Marketing at the International Hellenic University.

The main goal of this dissertation is the choice of the features and the designing of a chatbot for Thessaloniki in the Travel industry. To select the features that the chatbot will have, the websites TripAdvisor, Booking, Airbnb and chatbots Robin Travel Bangkok, Robin Travel London, Robin Travel Taipei and Prago have been analyzed. Furthermore, for the purpose of this dissertation, a company named Enchatted with expertise in the field of evaluating bots, has provided me access to the professional version of Botsociety, to create a chatbot. Therefore, Botsociety and its capabilities were used to design the chatbot.

I would like to thank my supervisors Pr. Ionnis Magnisalis and the company Enchatted for their guidance and providing the appropriate tools for the purpose of this Dissertation.

Kosmas Mokos

02/01/2020

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1 Introduction

The travel and tourism industry are one of the biggest industries in the world and the latest technological developments on the field of Information Technology (IT) have dramatically transformed the industry.

Artificial Intelligence and chatbots offer new possibilities to expand and enhance the online experience for our lives but also for businesses around the globe. AI is being used to build automated bots and help with all of this data generated daily, in order to make processes easier, faster and better.

The way a traveler organizes his trip has changed through the years. The technological advances of our time have laid the foundation for the emergence of alternative ways to assist users and provide them with the necessary information. One of those alternatives are chatbots.

The goal of this particular Thesis is the design of a chatbot-friend-guide for the visitor of the city. A chatbot that will accompany the user and provide information 24/7. The bot will be able to communicate with the user in a simple and straightforward way in order to provide him with the appropriate information for his journey. To be more specific, we are looking to create a bot for Thessaloniki that will serve as an operational and up to date tool for the traveler.

In the context of the Thesis, the Botsociety tool was used to help with chatbot design. Also, specific web pages and existing bots were used and analyzed in order to select the appropriate requirements for the Thesis bot.

To complete the above, I structure the analysis in this assignment on the following manner. First, in Chapter 2, I provide an in-depth analysis of existing literature concerning Travel and Tourism industry and Chatbots in order to answer questions such concerning the meaning of chatbots, their history and evolution and the effect they have on this industry.

Chapter 3 is the problem definition and the methodology for the steps taken to make design decisions. I have a description of the tool selection, the tool used in the project, the websites, apps and bots analyzed in order to create the content of the project, their analysis, design considerations.

Chapter 4 focus on the practical part of the assignment with the design of a chatbot for Thessaloniki. I provide a requirement analysis in order to choose the categories and subcategories of the chatbot. The following is the design of chatbot.

Finally, in Chapter 5, there is a summary of this assignment, the problems encountered and further steps that need to be taken to make the chatbot more complete.

By completing this Thesis, the chatbot will be able to provide information on some of the most important aspects for the organization of a trip.

2 Background

2.1 Travel and Tourism Industry

2.1.1 The role of technology progress in the industry

The travel and tourism industry are one of the biggest industries in the world and have experienced rapid growth over the past few decades. Based on recent findings, less popular destinations have also started to emerge and benefit from industry progress [1]. The latest technological developments on the field of Information Technology (IT) have dramatically transformed the industry, allowing travelers to have faster and easier access to information regarding their travels.

The establishment of the Internet as a widespread information infrastructure, is one of the major reasons for the industry's development. Even from the first decade of its existence (1991 to 2002), it has facilitated the average person to find useful information regarding destinations through the creation of websites that function as booking systems, search and virtual tours. During the last two decades (2002-present), the industry focused more on persuading and strengthening customer services. Web 2.0 played an immense role in the process, making the Internet an omnipresent factor in the industry through the use of mobile systems.

The so called 'Digitalization' of the industry has helped more people travel faster, easier and safer by providing them with a plethora of information regarding their destination of choice. During the previous years, the travel and tourism industry have dramatically changed the way travelers gather information, plan and make their trips through the Internet and its sustainable services. Nowadays, people use the Internet to gather insights for their upcoming trips. They seek a wide range of tourism experiences such as planning activities, organizing sightseeing trips, shopping, dining and researching information concerning upcoming events. The omnipotence of the Internet can also be credited to the rise of smartphones in conjunction with the emergence of social media. Travelers are now able to post pictures of their trips online, comment on their experience and express their like or dislike regarding different aspects of their trips such as accommodation, hospitality, food etc.

2.1.2 Industry sectors

The travel and tourism industry contain a variety of sectors to accommodate the needs of every traveler. These sectors are listed below:

- Travelling and means of transportation (airline industry, car rental, travelling by sea, bus services, railway, etc.).
- Accommodation (including hotels, hostels, camping, cruises, bed and breakfast etc.).
- Food and Beverage (including restaurants, catering, bars and cafes, etc.).
- Entertainment (including casinos, shopping, tourist guides and organized tours, etc.) [3].

Nowadays, marketers and managers of the travel and tourism industry try to combine aspects of the aforementioned sectors in order to find success in the travel business. For instance, they offer travel packets with airline tickets, accommodation, an offer for cheaper food and free admission to a specific museum. They combine different sectors of this industry and create the appropriate offer for their potential customers. In this way they compete amongst each other and include new revenue sources into their business model [2].

2.2 Bots

2.2.1 Defining chatbots

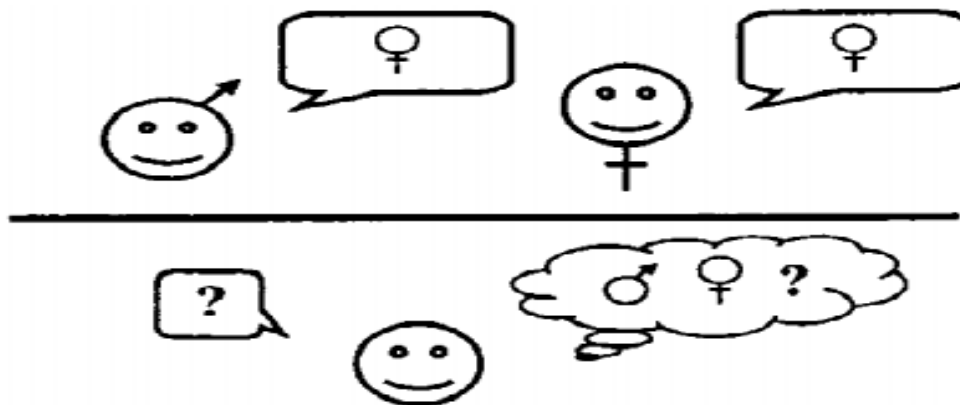
Digital assistants, conversational interfaces or just chatbots, the basic concept is the same, are computer programs that interact with users in natural language. Their purpose is to replace humans by stimulating a human conversation and be an absolute online assistant, for different purposes. It can be used as a traffic navigator, music playlist creator, weather forecast or customer service assistant etc. [9]. The concept of chatbots was first perceived in the 60's and it has been developed in order to be used in many sectors. They were designed to address everyday problems at all levels such as family daily needs, personal issues or business processes. They can help humans interact easily and remotely, allow companies to sell or advertise their products along with being an indispensable tool regarding medical purposes. Chatbots can be classified into two major categories: The intelligent chatbots and the unintelligible ones. The subsequent categories derive

from the level of interaction chatbots have with the user. Intelligent ones use machine learning in order to interact with humans, while unintelligent chatbots were programmed by humans to use standard conversation [10]. For present purposes, we will take the term chatbot to refer to any software application that engages in dialog with human users in natural language [4].

2.2.2 The evolution of chatbots through the years

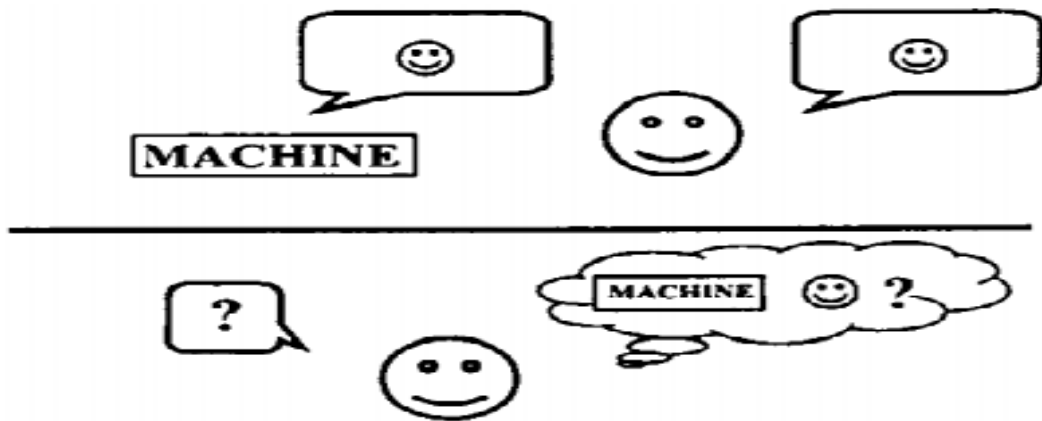
Turing Test

For a portion of researchers, The Turing Test represents the springboard of the “Artificial Intelligence” (AI) era. The test was first introduced in an article written by Alan Turing himself called ‘Computing Machinery and Intelligence’ published in the British journal ‘Mind’ back in 1950. In this particular article Turing posed a rather controversial question, “Can machines think?” [11]. The Turing Test, also known as the ‘Imitation Game’, was based on a total of three players, two of those belonging to different genders. The candidates are placed in two different rooms and try to guess each other’s gender by asking questions and getting textual responses. [11] The situation is depicted in picture 1.



Picture 1: Turing Test imitation game according to Alan Turing

In the original paper from Alan Turing the game and situation are described between humans from the different genders. But in fact, the questions purpose lies in understanding the differences between humans and machines [12]. This situation is depicted in picture 2.



Picture 2: Turing Test imitation game according to Alan Turing

Eliza

ELIZA is a chatbot with natural language processing capabilities created around 1965 [13]. The computer program was developed at the MIT Artificial Intelligence (AI) Laboratory by Joseph Weizenbaum [14]. The development of the ELIZA bot remains a big milestone as it was the first real implementation of a chatbot that was close to human interactions during that time period.

Alice

ALICE is considered to be one of the major milestones in the history of chatbots. Artificial Linguistic Internet Computer Entity (short ALICE) was originally created by Wallace in 1995 and since then has been used widely in chatbot development. The architecture of ALICE is separated by the 'chatbot engine' itself and the 'language knowledge model' which makes it flexible to add support for additional languages [15]. ALICE is a chatbot built using Artificial Intelligence Markup-Language, short as AIML. The bot's essence is to categorize patterns, so the users get the most appropriate answer with respect to their needs [16].

Artificial Intelligence gap

Since the introduction of the Turing Test and the first major chatbot ELIZA a large gap of novel technologies has been observed. The breakthrough during the 21st century - the so called fourth industrial era - is mainly attributed to the evolution of Machine Learning and particularly in the

deep learning concepts [17]. Since the introduction and the widespread of pre-built tools and libraries such as TensorFlow by Google, a large amount of companies started building applications based on Machine Learning and Deep Learning libraries to enrich their companies' capabilities, data usage applications and adoptions of a plethora of new services.

Voice activated chatbots

In the 21st century, Amazon, Microsoft, Apple and Google introduced chatbots too, but in a way that differed from ELIZA's and ALICE's approach. Instead of creating an interface for interacting with the bot the big four introduced voice activated and controlled chatbots. Apple's 2010 Siri was the first to be introduced. Shortly after, Google started with 'Google Now' that was implemented in the Android ecosystem in 2012. Amazon came next with its voice- controlled chatbot, named Alexa, which runs on their own hardware. Finally, Microsoft introduced the chatbot and voice-controlled bot called Cortana in the Windows and Windows Phone platform back in 2015 [5].

Bots for Messenger

Since the introduction of the voice-controlled bots by the aforementioned internet and technology companies, it became evident that voice- controlled chatbots were the next big thing. Thus, Facebook in April 2016 constructed a platform for creating chatbots inside their instant messaging platform 'Messenger' called 'Bots for Messenger'. [4] The introduction of the platform 'Bots for Messenger' was a major milestone for most business. As a result, many companies adopted it for their own purposes.

2.2.3 The utility of chatbots

Chatbots in education

The introduction of technological advances in the classroom has caused major breakthroughs in the field of education. With courses becoming all the more demanding and challenging, students have begun to look for help, information and guidance online in order to complete a research paper

or avoid any delays [10]. The implementation of chatbots in the field of education can serve different purposes:

- Administration: Informing students on enrolling procedures, potential scholarships, student exchange programs, availability of university services, activities organized in the campus etc. [9].
- Cooperation: Setting up chatrooms for college students in order to exchange ideas, complete group projects and reflect on their work [10].
- Student Progress: Setting up practice tests using chatbot applications to monitor progress. This can be useful for both the student's and the teacher's side. The application can offer an overall view of the student's development and offer insights on the student's weaknesses and strengths [19].
- Select elective courses: Updating the course description with the use of an updated chatbot, so as to help students make a proper decision by providing valid information concerning the outline of the specific course [20].

There have been cases where inefficiencies of the use of chatbot applications lead to user's disappointment and disturbance but for the major part, they seem to be of great use, mainly because students do not need to develop any particular programming skills to use these apps. On the contrary, users can interact with the bot using natural language in the online university platform [19].

Chatbots for medicine

The evolution of chatbots and the technological advances in the field of Artificial intelligence have added some new “weapons” to the health care armamentarium. Health telematics via chatbot applications have the potential to become a game changing medical tool which offers state of the art healthcare solutions [34]. Chatbot services of the health section provide advice and assistance delivery anytime and anywhere, overcoming geographical and temporal barriers and could emerge as key field of modern healthcare in the near future.

Examples of chatbots used in the field of medicine:

- Anna and Lucas chatbots were implemented based on Mobile Coach and were collaboratively designed by computer scientists, physicians, psychotherapists, and other experts targeting childhood obesity. Lucas and Anna were built and made to look like a

friend or peer of the patient and not just an anonymous intelligence providing challenges and solutions. They had the capability of making conversation and engaging in small talk as well as sending emoticons, attributes that are proven decisive in creating a friendly environment for the patient. Adding to the above, a comic representation of an ordinary teenager was used as a profile picture. Interim analysis of the intervention group from an ongoing RCT (Randomized Controlled Trial) indicate that the implemented THCB of Anna and Lucas, which took over the role of a peer character, engaged patients, over four months, to a remarkable extent. Patients' perceptions regarding enjoyment and attachment bond with the THCB were also found to be good [24].

- Woebot belongs to a category of THCB, which uses CBT (cognitive-behavioral therapeutic), a psycho-social intervention that aims to identify and manage symptoms of anxiety, depression and improve mental health [35]. It is an automated chatting agent which runs through a messaging application, accessible to both desktops and mobile devices. But except for all these CBT strategies, the bot was created to also include the following therapeutic-strategic features: Tailoring, goal setting, accountability, motivation and reflection. The study indicates that students who spent time chatting with the Woebot, demonstrated rather reduced symptoms of anxiety and depression compared to those who were given a self-e-book (information control group).
- Pharmabot: One of the most important factors in saving a human life from a fatal disease is prevention. The human body has its own mechanisms of protecting a disease from being fatal or damaging to one's health. But the majority of people do not keep up with the evolution of medications, they have invalid information concerning symptoms and their connection with a particular disease or have no idea how much dosage of a specific drug should be. For these reasons and many more, researchers came up with a medical chatbot that overcomes difficulties concerning distance or prior medical knowledge, the so called "Pharmabot". "Pharmabot" plays the role of a next-door pharmacist, who is constantly at the patient's disposal and provides immediate consultation to the user, can prescribe appropriate medication of generic drugs targeted for children. The whole process is based basically on the medical history of the user built during their interaction. The prescription proposed by the chatbot will be followed by the proper dosage, the side effect of the drug on patient's health as well as how the drug reacts with other substances. This specific invention can be really helpful for parents as it was built to support and inform them about issues their children might face [36].

- Freudbot is an agent programmed to mimic human conversationalists with the novel attribute to mimic a famous personality. Sigmund Freud was an Austrian neurologist and was also the founder of psychoanalysis, the famous clinical method and therapeutic technique aiming to treat psychopathology through dialog between the patient and the expert. Thus, the excellent idea of Bob Heller et.al constructing the Freudbot brings a funding figure of psychology to a chat service [38].

Chatbots in e-business

Sales processes have evolved over the years, due to the advance of technology. More and more people do business via the internet, resulting in issues that the business industry needs to address immediately. To be precise, improvements need to be made in the customer services sector. Customers experience long delays when trying to interact with a service agent and hence spent a vast amount of time trying to get a response. Also, in the case of live chatting, irrelevant responses and pre-written answers issues are also at stake [39].

Chatbots can prove to be a great solution for the improvement of customer services, as they can interact with multiple clients at the same time and reduce the costs of the enterprise. However, there are several issues that need to be addressed (S & Balakrishnan, 2018), such as instances of misunderstanding between the chatbot and the user and difficulties occurring in the selection process of finding the proper answer among different possible ones when a question is being asked [40].

Chatbot services are meant to assist users during their purchases, helping them find what they are looking for in the simplest of ways while also not discouraging them. We are now moving closer to an era where the technological services are going to take over the business world.

Chatbots as a key channel for sales

Chatbots as part of a company's customer service can prove to be a great tool, by offering many potentials and opportunities. Most of the customers' questions to the companies are repetitive, meaning that companies have a prior knowledge regarding customers' frequently asked questions [41]. In this case, the use of a chatbot can be more than beneficial because it can offer rapid and accurate responses to customers, providing a more qualitative service experience. Also, companies

can reduce costs by reducing the number of employees needed for customer service or reassign them to different tasks that could not undertake otherwise, boosting, this way, the productivity of the company.

Bigdata

An important term for the evolution of the business industry is the term 'Big Data'. Big Data is defined as the large volumes of information (data) used by companies. Given the fact the data are vast and cannot be processed using traditional methods, chatbots come into play. If big data is embedded in chatbots, even non-expert users without the appropriate knowledge can access information by a large amount of unstructured data through a chat. Information that can help companies in decision making processes regarding customer needs. So, integrating big data as knowledge base into the chatbots can generate dynamic responses to user queries. Also, the analytical capability of chatbots will increase due to access to a large amount of data and in this case, probably in the future, chatbots can be used as a tool for business analytics purposes [42].

2.3 Chatbots in the Travel and Tourism industry

Over the last years the technological evolution of smartphones has made mobile devices a necessary everyday tool in the life of an average person. From taking photos, browsing the Internet, receiving and sending e-mails, to booking a flight through a smartphone app, or searching for reviews related to a restaurant, smartphones are now a device that is an integral part of our daily routine. And this is also happening when it comes to traveling. People use different apps to find and book flights, rent a car, find a hotel, etc. Some of the most used apps for travelling are [21,22]:

- Skyscanner: You can book flights, accommodation or rent a car with this app. You can also find the cheapest dates to fly and get alerts when prices change.
- Kayak: This app is like Skyscanner, but it has exclusive deals you won't find on other sites. You can also set price alerts or use Price Forecast to see whether you should buy now or wait.

- Airbnb: This app offers an alternative way of finding the appropriate accommodation for your trip and gives the user the opportunity to choose from a variety of houses. The user can decide whether he wants to stay with a local or alone.
- Google Trips: This app can do almost everything regarding trip planning. From pulling reservations from emails, to adding hotel bookings and car rentals. You just set it up, you just browse through the app and look at curated day trips, as well as suggested and popular places to visit or eat at.
- TripAdvisor: When looking for reviews of restaurants, bars, famous landmarks, etc. then TripAdvisor is your app. In this app you can find millions of reviews, opinions, videos, and photos for everything related to your trip, such as hotels, airlines and many more. You can also use the app's forum to ask specific questions and other travelers can answer it.
- TripIt: You can use this app to organize all your travel itineraries and documents, so you don't have to search for them in your trip. You just need to send your reservations automatically to this app and then it is easy to view and find them. It is also possible to share your trip plans with whoever is picking you up from the airport or train station.
- Roadtrippers: This app is suitable for organizing your trip, by providing you the most suitable driving route and book hotels on your way. It is also used for finding interesting and non-mainstream places to visit as you go, finding cool restaurants and one-of-kind spots that you can bookmark and go back to during the trip.
- Packing Pro: This app is used to organize your suitcase with a checklist that breaks down what you'll need by category. In addition to packing lists, the app also reminds you of any important things you'll need to accomplish before traveling, such as renewing your passport.

Each of these apps serves a specific purpose, which is also the main complaint of users worldwide. For instance, TripAdvisor is mainly used by travelers to find reviews about restaurant and bars. Airbnb to find accommodation, Skyscanner to find flights, etc. Using different applications for different purposes has its drawbacks. If you want to have a complete overview of your trip then you need to download a big number of these apps since they all serve different purposes, meaning that you require a significant amount of storage space in your smartphone. Most of these apps become redundant after one trip and may need to be replaced with a different one. A more collective approach to structuring applications for the travel industry needs to be taken into account.

2.3.1 Chatbots are remodeling the tourism industry

Artificial Intelligence and chatbots offer new possibilities to expand and enhance the online experience for our lives but also for businesses around the globe.

AI is being used to build automated bots and help with all of this data generated daily, in order to make processes easier, faster and better. That is to create a more enjoyable customer experience. The Tourism and Travel industry is striving to have the best quality of services for its customers because it is often the main way of selling its products or services. That's why chatbots are perfectly suited for the needs of the tourism industry and will transform it [25].

Chatbots can help tourists make informed decisions in order to plan their journey according to their destination, budget and preferences [27]. Also, chatbots are getting better, smarter and more autonomous by collecting information from customers, helping travelers organize their trips and handling customer service requests at the time of need. Chatbots work 24/7 at the same capacity [26].

So, travel agencies, hotel services, other indirect businesses, and the tourism industry in general can take advantage of the chatbot's capabilities. Online chatbots offer an alternative to the aforementioned apps, as they don't create bloatware on smartphones, and they can collect all the notifications and updates for each of the services they'll be using during their trip in just one place and not in separate apps. It is also much easier to search for information or assistance using a chatbot, compared to searching an online travel website or app. Another key difference between chatbots and travel websites or apps is that in the first one, chatbots use machine learning to adapt to what the user is searching while also having the ability to gather information by asking questions to the user. In the case of websites and apps, the user has to become familiar with their interface so as to complete his task faster. On the other hand, chatbots can identify commonly used phraseology and search terms and understand travelers' preferences over time. They are also updated based on records of prior conversations with users, and their development is a dynamic process as they become smarter by interacting with users allowing the tourism businesses to offer improved services and user experience.

Another great benefit of chatbots is that they offer a more hands-on approach for the user. In the case of websites and apps, which are static, if the users cannot find the necessary information, they will simply move to a different source of information. Chatbots on the other hand, can either provide the necessary information themselves, or connect the users to a staff member for further

help. There is a strong relation and cooperation between chatbots and human employees, to provide users a better experience, and as a result retaining a higher number of customers due to the proactive customer support. Here are some cases, where bots are used in the travel industry [25]:

- **Live Info at Heathrow Airport:** A voice assistant bot, which is based in Amazon's Alexa and is used in the Heathrow Airport in United Kingdom. All passengers can use it with every enabled device, to find all the necessary information they need, such as flight numbers and details. The specific bot is still a working progress and further features will be added over time.
- **Destination Chatbot – Zauchensee:** This chatbot was created by the ski resort of Zauchensee to market themselves in a new and alternative way and to help customers in their journey. It is named “Zauchi” and travelers can engage with it 24 hours a day to find overview of the most relevant topics of their vacation and the region itself. Users can browse through a variety of categories, from events or special offers to asking for navigational assistance, so as to find a reliable answer to their question in a time-saving way. Their questions are answered immediately, without the need to connect them to a customer representative.
- **Tourism chatbot of the Serfaus-Fiss-Ladis region:** This is the digital assistant of the Serfaus-Fiss-Ladis region, called “Sunny” and it is used to help tourists organize their travels. By providing the most important information about infrastructure, travel topics, events and even real-time weather forecasts, it makes the travel experience easier.
- **Expedia.com:** Although Expedia is an Online Travel Agency for airline ticket bookings, hotel reservations, car rentals, cruises and vacation packages, the Facebook messenger chatbot that is implemented in it allows users to search only for hotels. The users just need to open the messenger app and tell the bot about their travel plans. Then the bot will show the five most popular hotel options in the chosen location. Once the users click in the suggested hotels, they are re-directed to the Expedia website where they can complete their booking. Finally, after the booking is finished, the users receive a message in the messenger app with a link to the itinerary [23].
- **KLM:** KLM Royal Dutch Airlines' chatbot uses Facebook Messenger's checkbox plugin on the checkout page and allows users to opt-in to receive booking confirmation, check-in notification, boarding pass and flight status updates via Messenger. This chatbot was built to improve and make customer services simpler. At the moment it can “speak” 13 languages and it responds to around 15.000 social conversations every week. In its first

month of implementation, this chatbot increased the volume of Facebook messages by 40 percent.

- **Booking.com:** As Booking.com has grown from a Dutch start-up to one of the largest travel e-commerce companies in the world, it is investing a lot in digital technology. Therefore, they implemented a bot in their website and app, so users can check availability, look for information like check-in times or even reserve a parking spot. One notable feature of this bot is that it allows users to initiate a conversation involving their account and lets hotels send notifications. With this bot, Booking.com is aiming to offer users a more personalized, gratifying and seamless travel experience.

It is obvious that more and more companies in the tourism industry are investing in their digital transformation, re-designing their business processes and implementing bots and other new technologies in their current operations and daily tasks. Like other industries, the travel industry is gaining a lot from these technologies and especially bots and Artificial Intelligence.

2.4 Benefits of using chatbots

The benefits chatbots offer to a brand in this industry are the following.

1. **Promoting effective offers** – Chatbots can offer products and services based on data of previous market preferences [28].
2. **Reduction of contact centers** – Contact Centers can be dramatically reduced as many of their functions, if not all, are available to chatbots [31].
3. **Automatic Insights Capture** – Once the users communicate with a company's bot, the company can automatically get their full name, language preference, profile photo, gender, and other personal insights.
4. **Rich Qualitative Data** – As potential customers interact with chatbots, creating qualitative data can be used by the company to create better customer offers and solutions. The chatbot can gather necessary information such as users' interests during the dialog with users. Companies get to know their customers and their preferences in a new way.
5. **Customer Satisfaction** – Customers interact with bots whenever they prefer. This is quite important because the user can be helped regardless of their time zone. Also, it can solve their doubts at the moment and wait no more for an operator to be available [28,30]. A further advantage is one-to-one communication. Users no longer have to search the website

to find right information like services, products or prices. In case of customers inquiries or complaints, chatbots are helpful, supportive, and capable [43].

6. More Revenue Opportunities – As chatbots have the ability to engage and give extra services as offers, and add coupons, they create the conditions of revenue growth [32].

Chatbots are available 24/7 for travelers – potential customers, in each step, helping create the best possible outcome for them [27].

2.5 Bot frameworks

Internet bots can be developed in different frameworks. So, what is a framework? It is a digital space where developers build bots using predefined functions and classes. In this way it is easier to create a customized bot rather than starting from zero. Bot frameworks are different from bot platforms. The first ones are more complicated, ready-made code snippets that plug into an API easily. The second ones allow users to create bots using drag-and-drop functionality, without the need for them to have coding knowledge.

The framework that will be used to develop a bot depends on the use of the bot and the familiarity of the developer with the platform or framework. For example, a chatbot that needs to answer frequently asked questions in Facebook Messenger will require much less from a framework than a bot that is developed to complete more complex tasks. Some of the bot frameworks are [44,45]:

- Chatfuel: A user-friendly platform to create chatbots for Facebook or Telegram. It requires no coding; it offers a visual development environment and analytics and supports 50 languages. It is easy to learn and free, however its free version contains advertisements.
- Botpress: This is an open-source bot-creation tool, written in JavaScript, allowing users to build, deploy, manage and scale bots, in a modular framework. Beginners will find it hard to use, as it is professional oriented. Great for customer support, offering flexibility, Botpress is aiming to boost efficiency and transparency, while keeping it simple.
- Microsoft Bot Framework: This framework is powerful with an arsenal of connectivity behind it, making it suitable for developing bots with serious customization and strong capabilities. A set of predefined functions and classes is provided by the Microsoft Bot

Builder, but coding is also necessary, making it harder for developers with no technical background to create a bot with this framework.

- Pandorabots: This is focusing on developers who want to build quality bots leading in business results. It is mainly used for chatbots for B2C messaging, commerce, customer service, entertainment, marketing and voice interfaces. Developing a chatbot with this framework requires putting some time, as it is updated and improved, when more data are collected.
- IBM Watson: This is a platform that allows efficient and fast chatbot development, with an easy to use interface, Watson Assistant, tutorials, analytics and data privacy. What is more, developers can exploit the bot asset exchange and don't start building the bot from scratch. However, this platform has limited connectivity with third-party platforms.
- Amazon Lex: This framework allows users to create bots that can easily process voice or text input interchangeably. Integration with the digital personal assistant Alexa is easy for a bot built with Lex. It is also simpler to use than other leading bot frameworks and developers can enjoy the benefits that come with the Amazon platform, such as low hosting costs, syncing, etc.
- Google Cloud Dialogflow: This framework, which was previously known as API.AI, is provided by Google and is less strong than the Microsoft's and Amazon's. It offers prebuilt agents, multi-language support, in-line code editing, and they are easily integrated with Google Home. What makes it unique from other frameworks is the analytics program it has, Chatbase, which provides information about how, when, and who are using chatbots. This is really important for developers as they can take advantage of these data and improve their bots.
- Botkit: This is one of the leading bot developer tools. It allows the development of bots with the help of visual conversation builder and the addition of plugins depending on the user's needs. It operates on natural language processing engine and it can also support open source libraries.

Internet bots can be split in two main categories: text-based bot and voice-based bot. The differences between the two are pretty clear. In the first case, interaction between user and bot is achieved through text messages, while in the second case, by "talking" to it [46]. Both categories have their similarities and differences, and each is best suited for different cases.

Both bot categories are developed to assist users in finding what they want. The user may be looking to find the weather in a specific location and both of the bots will provide an answer. They

both rely on Natural Language Processing (NLP) and Natural Language Understanding (NLU) [47] and they can operate in mobile and other devices.

The main difference between these two types is how users interact with them. In the text-based bots, users interact with them on a screen via text or pressing buttons from the options the bot is offering. They can be encountered in more than one messenger platforms, both online (like Facebook Messenger) or offline (like SMS). On the other hand, a voice-based bot can be located in a variety of devices, such as smartphones, laptops, speakers, wearables or any IOT (Internet of Things) device, and it allows users to interact with it hands-free. Another main difference and a benefit of the voice-based bot, is its ability to exist in multiple messaging platforms, synchronized across devices. What is more, text-based bots need to understand short form of words or typos and slang that users may use in their interaction with the bots, whereas a voice-based bot needs to understand the accent of the questioner, requiring from it to be “smarter” than a text-based bot. Finally, chat-based bots can be triggered easier as the user just needs to start typing in a device, whereas a voice-based bot may require a computer or a smart speaker.

The type of bot that a company will implement depends on their needs, the use of the bot and some other factors. Text-based bots are used more often and are more suited if the company has restrictions in its budget. Implementing a text-based bot is much cheaper than a voice-based, so it will be more suited for a company with budget constraints. Text-based bots are also a better option for simple tasks, for instance in the case where a user is just asking for the price of a product, etc. and not in more complex ones. In case the customers of the company make inquiries using their smartphones, or they need a screen to text and interact with the bot, then a text-based bot is a better fit.

On the other hand, voice-based bots are becoming more and more popular and adopted by companies. This type of bots requires a big amount of money, but if the company can afford then it is worth. Voice-based bots are also great if the users of it are multitasking or are physically challenged, as they do not have to type, and they just talk to the device. Some companies combine text and voice to make things more live and fun for the users. In this case the bot is presenting the text with voice.

2.6 Chatbot design tools

In cases where we do not have an actual chatbot platform to work with, there are tools which one can use in order to create a prototype. A prototype helps users see how the chatbot looks like. So, before creating a chatbot, a prototype must be created with the help of design tools. Having different prototypes is an even better way of understanding the core features that the user wants its chatbot to have.

Tools to create chatbot prototype [48]:

- BotSociety: Get real time previews for Facebook messenger, WhatsApp, Slack, Google Home and so on. There is the capability to structure conversation paths and export the prototype as PDF, a GIF, or an AVI file. It is easy for the user to edit it. The developers can do advanced editing because there is a code pad.
- BotMock: This platform supports most popular social media platform like Facebook, Skype, Slack and so on. There are dozens of drafts that can be easily enhanced. Also, there is the capability of collaboration (share the prototype with a team).
- Typeform Chat: In this platform, there is an option to add gamification and a funnier way to create the structure. There are over 500+ fixed integrations as well.

2.7 Channels for chatbots

An extra and important feature of chatbots is choosing the channel you want to create them in. A company has a variety of options regarding platforms that they want their chatbot to be based upon. Selecting a platform depends mainly on their customers' preferences, meaning which platform they use the most. There are various types of channels.

- One of them is creating a chatbot as a widget on the website or the app of the company. When visiting the website, the user will be able to contact with the chatbot and receive the necessary information.
- Chatbots can also be merged with world-famous virtual assistants and an extra service can be created on these platforms. Some of these platforms are Amazon Alexa, Apple's Siri, Google's Voice assistant, Microsoft's Cortana and others. This channel is quite important because every smartphone has one of these platforms.

- An additional channel option is messenger applications like Facebook messenger and WhatsApp. They are used by billions of people and have a tremendous advantage. The user does not need to download another application or visit a website, since he/she can simply start a conversation with the chatbot.

2.8 What the future holds

Given the recent technological advances, we are at a breaking point of chatbot developing. Statistics show that the number of smartphones sold to end users was 1.56 billion in 2018. In addition, billions of users have access to a mobile messenger app, the most popular being WhatsApp (1.6 billion) and Facebook messenger (1.3 billion). Based on the above, it is fully understood that chatbots are becoming omnipresent in modern society [5,6,7,8]. Using a chatbot offers immense advantages to the user due to its simplicity. The user can get the desirable information without having to get into complex procedures. It can be as easy as arranging to go for a coffee with a friend. Adding to that, the chatbots' around the clock availability is another reason why these platforms are taking over the business industry [5].

3 Problem Definition and Methodology

3.1 Problem Definition

The way a traveler organizes his trip has changed through the years. This change is mostly due to the technological developments of our time. To be more precise, ever since the Internet became an integral part of our everyday life, the amount of information the user receives is vast. The same thing applies for the Travel industry. Nowadays, the average person can gather large volumes of information before or during his or her trip. Anyone that wants to go on vacation can make his own research using the Internet, browsing sites or using applications that provide the appropriate information. The technological advances of our time have laid the foundation for the emergence of alternative ways to assist users and provide them with the necessary information. One of those alternatives are chatbots. So, our purpose is to create a bot that will help the user-traveler collect information regarding his trip (accommodation, places to eat and go sightseeing etc.). The only thing the user has to do is interact with the bot and receive the information. He will no longer need to download a specific application. He will only need to converse with the bot at any given time. The goal of this particular Thesis is the creation of a bot-friend-guide for the visitor of the city. A bot that will accompany the user and provide information 24/7. The traveler will neither need to search on different sites or applications nor will he have to turn to a travel agency so as to plan his vacation. The bot will be able to communicate with the user in a simple and straightforward way in order to provide him with the appropriate information for his journey. To be more specific, we are looking to create a bot for Thessaloniki that will serve as an operational and up to date tool for the traveler.

Moreover, the creation of a bot for the city, will help promote Thessaloniki as a tourist destination. Through the interaction with the user, the bot will collect data which, in the long term, will create a behavioral pattern of its users.

Essentially, the bot will have a twofold nature. On one hand, it will ease the traveler's experience and on the other hand it will promote Thessaloniki as a tourist destination.

3.2 Methodology

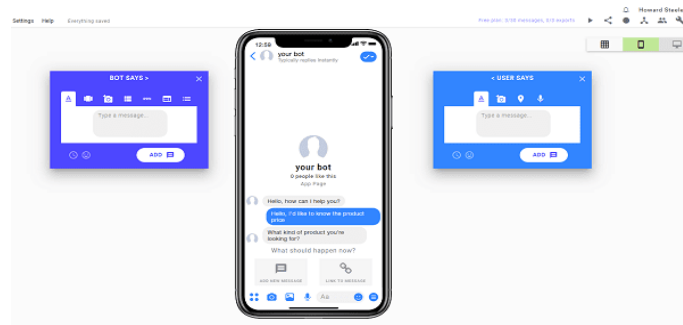
Here we have a description of

- the tool selection.
- the tool used in the project.
- the websites, apps and bots analyzed in order to create the content of the project.
- their analysis.
- design considerations.

3.2.1 Tool Selection

In the context of the Thesis, the Botsociety tool was used to help with chatbot design [49]. Botsociety is an ultimate conversation design tool which allows the user to preview and prototype chatbots. It is a design solution that offers significant capabilities:

- It allows the user to design conversations for any platform, including Messenger, WhatsApp, the Google Assistant, Alexa, Slack, and more. Each platform is customized for that tool specifically, so that users can be sure that all of their designs will flow as intended.
- It helps visualize the chatbot interface. The flows that the users design will instantly appear in a prototype, they can review their work and determine if they are on the right path before handing their work over for development. Essentially, BotSociety will help build a prototype that will show what the chatbot looks like.
- Botsociety is a straightforward tool, using features such as drag and drop, undo and redo and inline editing. It enables users who are not developers to operate it and get to more advanced levels of editing without any coding knowledge.
- It also offers the capability for automatic flowchart generation and the exportation of it in PDF, Excel, AVI which can help developers understand what the designer wants to achieve.
- Finally, and most crucial point is that Botsociety gives the user the possibility to export the designs to the technology tools used by developers to build the chatbot.



Picture 3: Botsociety interface

All of the above helped us select Botsociety as a tool in order to create a design of the Thesis chatbot.

3.2.2 Botsociety

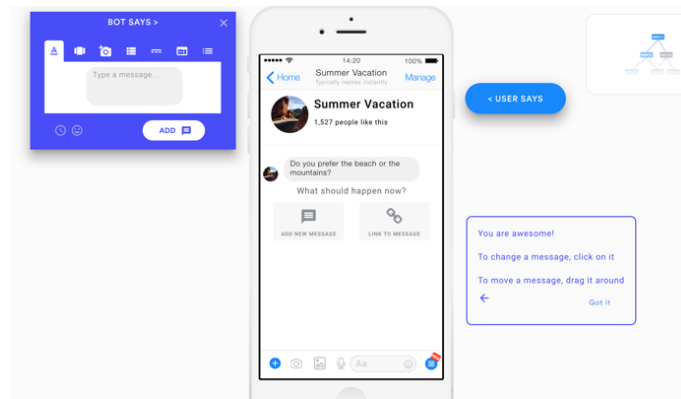
In the context of this case study, it was decided that only the bot would speak. The user would be able to reply only with keywords or pressing buttons. This is because the bot is not yet connected to an API. So, it cannot be smart and could not understand what the user said.

Basically, we designed a chat bot that talks to the user guiding him on what to answer and giving him the default answers.

For the proper design of the conversation the features of Botsociety tool were analyzed and used [49] Below are just the ones used.

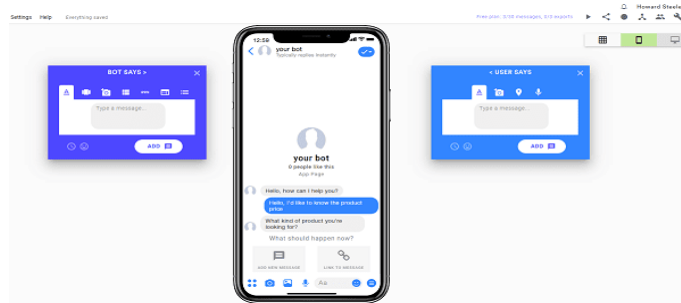
Features of the bot – Bot says:

- Text message: Enables the bot to write a simple message with letters and emojis.



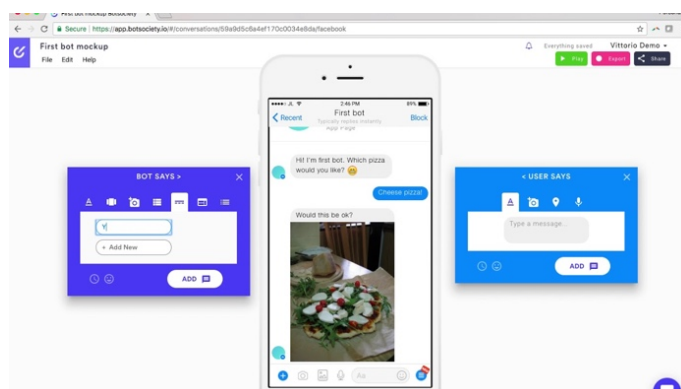
Picture 4: Text message

- Carousel: The designer can use it in order to give the user choices in carousel format. The Carousel format shows one or more images. Every image contains a title, a subtitle and up to 3 buttons.



Picture 5: Carousel format

- Media: The tool gives the bot the capability to chat with users with media format. In this format, the bot displays a message with an image or video including a written text.
- Buttons: The tool gives the bot the capability to chat with users giving them up to 3 choices in buttons format. This format includes written text.
- Quick replies: The bot gives up to 11 choices to the users in quick replies format.



Picture 6: Quick replies

Features of the user – User says:

- Text message: Enables the user to write a simple message with letters and emojis.

The tool gives the designer the ability to decide how many seconds each message will remain before the next one appears. Messages are shown for 0.5 – 40 seconds.

Extra design settings:

- Bot name: The name of the bot.
- Bot picture: The picture that the user will see when he engages in a conversation with the bot.
- Number of fans: The number of fans that the user will see at the beginning of the conversation with the bot.
- Page category: The category in which the bot belongs.
- Welcome screen, Facebook ads or nothing: What the designer wants to show when the conversation starts.

Design settings

Everything saved

Bot Name *

This is required. 0 / 75

Model * Model Color * Language direction *

iPhone X Silver Left to right

Number of Fans * Page Category *

23 App Page

2 / 10

☐ Welcome Screen ☒ Facebook Ad ☐ Don't show anything

Page name *

0 / 60

Picture 7: Design settings

Additionally, the tool allows the designer to test the conversation sending a link. The testers can have a virtual experience and give feedback to the designer answering some questions or commenting on their experience.

Finally, another crucial part is the fact that the designer can export Video, CSV/Excel and PDF of the prototype directly to the technology used by developers such as Dialogflow and Rasa. These functions facilitate and speed up the processes of designing and developing a chatbot.

3.2.3 Material analyzed

Below is a list of the websites, applications and bots chosen and the reasons behind the choice.

We chose sites such as TripAdvisor based on the answers given by tourists in the Survey of Client Satisfaction & Hotel Performance in Thessaloniki in June of 2016 [62]. TripAdvisor was selected because it was ranked first in the travel and tourism category according to Similar Web. Booking was selected because it was ranked first in the travel and tourism – accommodation and hotels according to Similar Web. Airbnb was selected because it was ranked second in the category travel and tourism – accommodation and hotels according to Similar Web. Expedia was selected because it was ranked second in the travel and tourism category according to Similar Web [57].

Websites that help travelers on their journey:

- TripAdvisor: a travel and restaurant website company that shows hotel and restaurant reviews, accommodation bookings and other travel-related content. It also includes interactive travel forums. TripAdvisor is the largest "social travel website" in the world, with about 315 million reviewers and over 730 million reviews of hotels, restaurants, attractions and other travel-related businesses. It helps travelers to find insights about hotels, things to do, restaurants, flights, cruises, rental cars, vacation packages [50, 51].
- Airbnb: an online marketplace with about 150 million users and more than 260 million guests who have booked and stayed in Airbnb properties across the world. Airbnb arranging or offering lodging, primarily homestays, tourism experiences, adventures and restaurants [52, 53].
- Booking: a travel fare aggregator website and travel metasearch engine for lodging reservations. The website has 28,425,726 listings in 148,470 destinations in 228 countries and territories worldwide. Each day more than 1,550,000 room nights are reserved on the

website. Booking beyond accommodation also provides information on flights, car rentals, tours and activities and airport taxis [54, 55].

Existing bots that helped travelers during their journey (bots with the most views in their category were selected):

- Robin Travel Bangkok, London, or Taipei: helps travelers get around, find what to do, get connectivity, deliver essentials, get in touch with locals, find the best way from the airport to the hotel, get local sim card at the airport and help traveler find the best restaurant. This bot has over 100 thousand views [56].
- Prago: a chatbot for visitors of Prague, available 24/7 on the Facebook Messenger app and on the web with over 100 thousand views. Prago's goal is to help traveler experience in Prague and provide the traveler with the practical information, show the hidden gems of the city and take him or her to the best local places [56].

3.2.4 Analysis of materials

In order to analyze and select the appropriate requirements for the Thesis bot, specific web pages and existing bots were used and analyzed. As mentioned above, the websites are TripAdvisor, Booking, Airbnb and Expedia. The bots are Robin Travel Bangkok, Robin Travel London, Robin Travel Taipei and Prago (a bot for Prague). The information that each one offers display similarities and differences.

Information from each source separately:

TripAdvisor was selected because it was ranked first in the travel and tourism category according to Similar Web [57]. It offers insights about:

- Hotels with subcategories like Centrally Located, Family-Friendly, Business, Hotels with free Breakfast, Romantic, Classic, Trendy, Charming, Mid-Range, Boutique, Hotels with free Parking and Hotels with Spa.
- Things to do and many subcategories are included. Some of them are Shopping, Food Tours, Museums, Tours and sightseeing, Sacred and Religious Sites, Historic Sites, Sights and Landmarks, Specialty Museums, Monuments and Statues, Points of Interest and Landmarks, Food, Wine, Nightlife, History Museums, Churches and Cathedrals.

- Restaurants divided into subcategories such as Dinner, Launch, Breakfast, Cheap Eats, Mid- Range, Cafes, Seafood, Steakhouses, World-Cuisine and Fast Food.
- Flights and their prices.
- Cruises and their prices.
- Rental cars and their prices.
- Vacation packages and their prices.

Booking was selected because it was ranked first in the travel and tourism – accommodation and hotels category according to Similar Web [57]. It offers insights about:

- Hotels and their prices divided into subcategories depending on filters. Some of them are Star rating, Distance from the town's Center, Beach Access, Property Type, Review Score, Room Facilities, Neighborhood and Chain.
- Flights and their prices.
- Rental cars and their prices.
- Tours and Activities with subcategories like Most Visited this week, Must-sees and Explore by interests which are Museums, Activities, Family and Amusements, Tours and Sightseeing.
- Airport taxis and their prices. Information of how you can leave from the airport without suffering.

Airbnb was selected because it was ranked second in the travel and tourism – accommodation and hotels category according to Similar Web [57]. It offers insights about:

- Stays with subcategories like Entire homes, Hosts with a Pool, with a Kitchen, Book Instantly, hosted by a Superhost, for work trips, Pets allowed, Neighborhood, Include Breakfast, with a hot tub and Offers include Check in.
- Tourism experiences divided into Classes and Workshops, Food and Drink, History and Local causes.
- Restaurants separately.

Expedia was selected because it was ranked second in the travel and tourism category according to Similar Web [57]. It offers insights about:

- Flights and their prices.
- Hotels and their prices divided into subcategories depending on filters. Some of them are Price, Best Deals, Distance from Downtown, Guest Rating and Property Class.
- Bundle and Save. In this category, Expedia offers package deals to customers like Flight + Hotel, Flight + Hotel + Car, Hotel + Car, Flight + Car.
- Rental cars and their prices.
- Cruises and their prices.
- Things to do and many subcategories are included. Some of them are Tours & activities (Tours & day trips, Private & custom tours, Cruises & boat tours, and Water activities), Tickets (Shows & concerts), Interests (History & culture, Food, drink & nightlife, Adventure & outdoor, Shopping & fashion and Classes & workshops).

The bots selected are the ones with the most views in the Travel category according to BotList [56].

The bots named Robin Travel Bangkok (145.8 K views), London (110.1 K views), and Taipei (95.2 K views) help travelers to:

- Get around with Ride Hailing, Airport Rail Link, Airport Transfer, Long Tail and other ways that traveler can move to each city (e-scooter, tuk tuk)
- See and do. The Robin Travel bot offers insights about Attractions, Guided Tours, Theme Parks, Museums, Day Trip and Experiences.
- Get connectivity. Practically, this category helps travelers to take information about how to get a sim and Wi-Fi password in each city.
- Nice to Know. The bot gives some special insights for the city like Typical Food and city's itineraries.
- Get in touch with locals. Help the travelers overcome the language barriers.
- Eat and Drink with subcategories like Fine Dining, Mid-Range, Romantic, Bars, Night Club.

The bot named Prago (102.7 K views), helps travelers to:

- Find a hotel.

- Practical Guide. Give travelers insights about Map, Prices, Money, Transportation, local Wi-Fi, Be aware of Scams, public Bathrooms, Tipping, Safety, Emergency, public Plug and Sockets.
- Tips about where to go, what to eat, what to drink, what to try, what to do, what not to do and when to come.
- Hacks about local language, what to avoid, free ride bikes and public tours.

Additionally, according to the Survey of Tourist Profile & Satisfaction and Hotel Performance conducted in Thessaloniki in April 2019 [63], travelers answered the following on the Reasons for Choosing Thessaloniki (descending order):

- City Personality
- Culinary interest
- Archaeological sites/ Cultural interest
- Interesting Shopping Center
- Extensive areas for walking, cycling etc.
- City Events
- Tempting traveling package
- Medical Reasons
- Passer-by

3.2.5 Design Considerations

The main subject of this dissertation is the design of a chatbot that will make organizing a journey for the user a much easier experience than before. We try to include all the searches and bookings that the user will make during his trip into this chatbot, meaning that he or she will no longer need to research different websites or applications to find the optimal flight or accommodation packages. For the fruition of the chatbot, we have set a series of design principles listed below[58,59]:

- The personality of the chatbot: We should avoid making the chatbot too realistic. Humanlike techniques such as ‘is typing...’ may make the user feel deceived which would lead to a bad user experience.

- **Simplicity is key:** The chatbot should not be a complex tool for the user. Its goal and limitations should be clear, and the user must acknowledge them. Interactions between the user and the chatbot should be short and precise.
- **Respecting the chat medium:** A simple chatbot experience is our main goal. There is no reason in trying to implement an entire app to the chatbot, since the subject of the bot is to reduce the use of lots of apps and interface.
- **Optimization:** There is no reason in designing a chatbot if a human can provide better results for the end user. On the contrary, the chatbot's purpose is to improve the qualities that humans are slow at.
- **Adding structured input to the chatbot when possible:** It is of extreme importance that the conversation between the chatbot and the user does not lead to a dead end. The user should not be put in a position where they do not understand what information input must be provided. Integrating custom options and limited range of input is desirable (e.g. When the chatbot asks a question where 'Yes' or 'No' are the possible answers, then the chatbot can provide a simple 'Yes' or 'No' option to the user).
- **Providing conversational tips and clues to the user:** Utilizing the chatbot's capabilities to the fullest is our main goal. Occasionally, when the chatbot makes conversation with the user by asking questions, directional clues and suggestions with simple answer message buttons will be provided to the user.
- **Creation of a bond between the user and the bot:** The bot will commence interaction with the user by greeting him using his or her name, thusly creating a feeling of personal connection between the two parties.

3.2.6 Bot Name

The name of the chatbot plays a defining role since it can make the bot a more effective tool. Depending on the name given to the bot, the psychology of the user is influenced. It can be a human name, a robot name, a descriptive or just a clever name depending on its purpose. It is extremely important that it is a memorable name so that users can recall it with ease [60].

3.2.7 Platform Selection

The platform for the publication of the bot will be chosen based on the location of its potential users. Potential users are all tourists that will visit Thessaloniki in the future. According to the Survey of Tourist Profile & Satisfaction and Hotel performance conducted in Thessaloniki in April 2019, tourists arrive in Thessaloniki by plane and they mainly come from countries such as Germany, The United Kingdom, Cyprus, Russia, Italy, The Netherlands, Turkey, Israel, Poland and Belgium.

The chatbot is a technological tool that interacts with its users. There are several platforms of communication in which the user can utilize the bot. Some of them are listed below [49]:

- WhatsApp
- Facebook Messenger:
- Your own app or website
- SMS/MMS
- Slack
- Google Assistant
- Alexa Skill
- Twitter
- Google Hangouts
- Apple Business Chat
- Messenger extension

The top messaging apps worldwide are WhatsApp, Facebook, Messenger, Skype, Viber and others, as shown below in Table 1 [64].

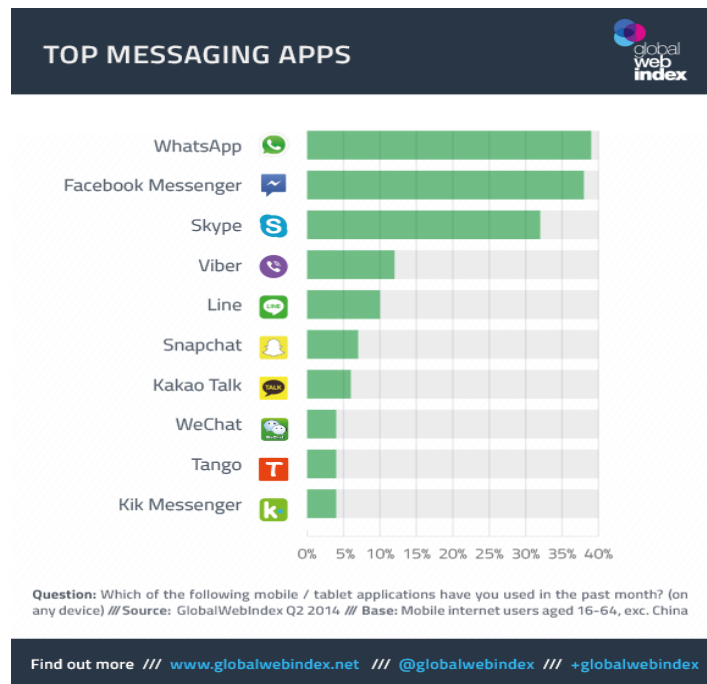


Table 1

3.3 Research Questions

In the context of this dissertation, we will be looking to design a chatbot with the purpose of creating it in the future. We will attempt to answer the following questions:

RQ1: What features will the chatbot have?

RQ2: How will the chatbot be designed?

4 Designing

Answering the first RQ (research question).

4.1 Requirement analysis

These are the sources analyzed for the purpose of coming up with ideas on which of them to use for the Thesis chatbot. It was found that the sources included in the research offer similar information but with different terminology. Regarding websites, all of them either offer information for accommodation or a booking system through which the user chooses the appropriate lodging. The user is provided with different options for entertainment, places to eat or drink and a reservation service. Additionally, we observed that 3 out of 4 sites provide a car rental service to help the user rent a car so he can move around during his visit. Another information we get by visiting these particular sites and bots is the fact that they provide tips on things to do in the destination of your choice. We observed that even though differences in naming across websites are evident, they all refer to the same Archaeological sites, museums, monuments, popular spots for the visitor and a variety of events and tours happening in the city. Bots also offer emergency contact information as well as tips on what visitors should be aware of and what events they must not miss. These are some of the options that appeared in almost every source analyzed.

4.1.1 Selecting categories and subcategories

To begin with, a chatbot with few functions will be designed. In essence, we will create a chatbot that will be simple to use and offer the most valuable information to the user when visiting a city or a country. The purpose of the chatbot is assisting the user in organizing his journey in the easiest way possible. It will provide the user with all the necessary information without the need of researching from a variety of resources. The information given to the user will be selected based on suggestions from the top websites and bots of the category and the needs of the city.

One category is accommodation, since it is the largest and arguably the most important sub-sector of the tourism industry [61] and one of the categories appearing in all sources analyzed.

Another category appearing in most of the sources is food and beverages. Food and beverage play an important role in the hospitality industry and no business in the travel, tourism and hospitality sector can flourish without including a F&B department [33]. It is common sense, since finding a good restaurant or going for a drink is an essential part when visiting a new destination.

An additional category is Places to visit. Popular spots in the city that the user must visit before leaving as well as information on events or services that will make the exploration of the city an unforgettable experience.

Moving on, means of transportation is an additional aspect of the bot. The user will be provided with information regarding how to move around the city using transportation services, thus saving valuable time.

Last but not least, emergency information will also be given. When you are home, you know how the system works. In case of an emergency, you know how to quickly call for help. At home, you have family, friends, and neighbors close by, whom you can count on for help. In faraway places, things may not work the same way. If you're traveling alone, you may not have someone to immediately come to your rescue, in case something untoward happens. More than two-thirds of global travelers feel that safety and security is of greatest concern when choosing an international travel destination. This means that safety plays an important role when choosing a destination, and the user will be provided with emergency numbers for a variety of possibilities [29].

Based on the above, we selected and created the following categories and subcategories.

1. Accommodation:
 - a. Hotels:
 - i. High Cost
 - ii. Mid-Range
 - iii. Low Cost

Accommodation subcategories will be included based on the financial requirements per night.

2. Food and Beverage:

a. Places to eat:

- i. Seafood
- ii. Greek Cuisine
- iii. Family Friendly
- iv. World Cuisine

b. Night Life:

- i. Night Clubs
- ii. Traditional tavernas with local alcoholic beverages (tsipouro)
- iii. Wine Bars
- iv. Beer Bars
- v. Cocktail Bars

c. Cafes

For food, subcategories will be selected based on the type of food. Most of the choices given will offer insights on traditional Greek and local cuisine, but international gastronomy will also be included. For drinking, categories and subcategories will be selected based on the desires on the traveler.

3. See and Do:

- a. Sightseeing
- b. Museums
- c. Guided Tours
- d. Events

Archaeological sites and museums as well as popular spots for tourists will be included. Additional information regarding events taking place in the city will also be given.

4. Getting Around:

- a. Beat
- b. Bus
- c. Car-bike rental
- d. E-scooter
- e. Airport Shuttle

- i. Private Coach
- ii. Public Coach

A variety of ways to move around the city (public and private means of transportation) and its suburbs will be included.

5. Emergency:

- a. Phone Numbers
 - i. Police
 - ii. Ambulance
 - iii. Fire Department
 - iv. The European Emergency numbers
- b. Medicine
 - i. Treat pain and fever
 - ii. Period Pain
- c. Hospital
 - i. Link with site that provides information on which hospital is on duty.
- d. Pharmacy
 - i. Link with site that provides information on which pharmacy is on duty.

All emergency numbers as well as on duty pharmacies and hospitals will be provided. In the context of this dissertation these categories will be used and developed appropriately.

Answering the second RQ.

4.2 Name choice

The chatbot will be named ThessBot. Thess from Thessaloniki and Bot because it is important to remind the user-traveler that his personal guide is a in its essence, a bot [18]. It is a short and clear name that clarifies the identity and use of the bot, thereby a memorable one.

4.3 Selecting a profile picture

The profile picture will portray a robot (for the aforementioned reasons) [18] that has the qualities of a guide (to make its purpose clear).

Optimally, blue will be the color of choice since Thessaloniki is a coastal city and blue is usually the color portraying the sea and the sky.

4.4 Platform Selection

For the selection of the ideal platform, two major issues were taken into consideration. To begin with, the place of origin of the visitors of Thessaloniki. Research has shown that visitors are usually of European descent but travelers from The United States and Russia also visit the city. Moving on, we conducted research to determine which communication platform is the most popular worldwide. Results showed that WhatsApp was ranked first and Facebook Messenger second. Unfortunately, the chatbots used in this dissertation were all linked with the Facebook Messenger platform. Given the fact that the differences in the levels of use between the two apps were small, we decided to, initially, upload ThessBot in the Messenger platform.

4.5 Design

Designing the chatbot was based on the research conducted previously with the goal of creating a bot that has the ability to communicate and interact with the user by pressing buttons (readymade answers). The aim of this dissertation was to design a chatbot, not develop it.

Thus, a chatbot that is easy to use and can communicate with its user in natural language was designed.

Chatbot presentation:

- Initiates conversation with a polite greeting and an emoji to make the it more personal.

Text message:

- Hi (greeting emoji)

- It's nice to meet you!
- Continues by introducing itself to the user and informing him or her about its origin and the services it can offer.

Text message:

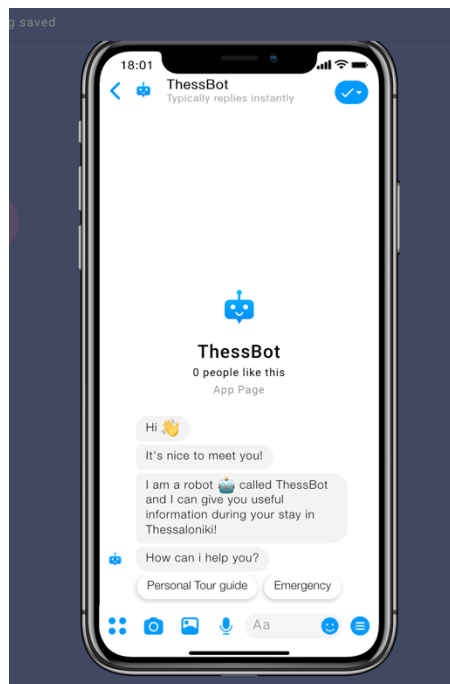
- I am a robot (robot emoji) called ThessBot and I can give you useful information during your stay in Thessaloniki!
- Poses a question to the user through a text message, asking whether it can help him and how, giving two options.

Text message:

- How can I help you?

Quick Replies:

1. Personal Tour guide
2. Emergency



Picture 8: How Chatbot starts

If the user selects the Emergency option, then the bot replies with the following:

- Shows concern and wishes nothing bad happened to the user, offering the relative services in the form of quick replies.

Text message:

- Oh...
- When travelling, the most important part is our safety and hopefully nothing serious has happened.
- I could help you with

Quick Replies: Provides information on the services it can offer in the form of quick replies. Some of these are the following.

1. Phone Numbers → If the user selects this category, two options in button form are given.

Buttons:

- ♦ Phone Numbers → If the user selects Phone Numbers, a variety of emergency telephone numbers is given (Carousel form).
- ♦ Continue my tour → If the user selects this option, he is linked to the Personal Tour Guide pathing result.

2. Medicines → If this category is selected, two options in buttons form appear.

Buttons

- ♦ Medicines → If the Medicines option is pressed, the bot asks the user about the nature of his problem and offers answers in the form of quick replies.

Text message:

- Your problem is

Quick Replies:

1. Problem 1 → Selecting this category.

- Medicine 1 → Link to a website with information on the medicine.
- Medicine 2 → Link to a website with information on the medicine.

2. Problem 2 → Same design as in Problem 1 with the appropriate medicine.

- ♦ Continue my tour → If the user selects the Continue my Tour option, he is linked with the Personal Tour Guide pathing so he can move on.

3. Hospital → If this category is selected, the bot informs the user about on duty hospitals for the given day, providing the appropriate link.

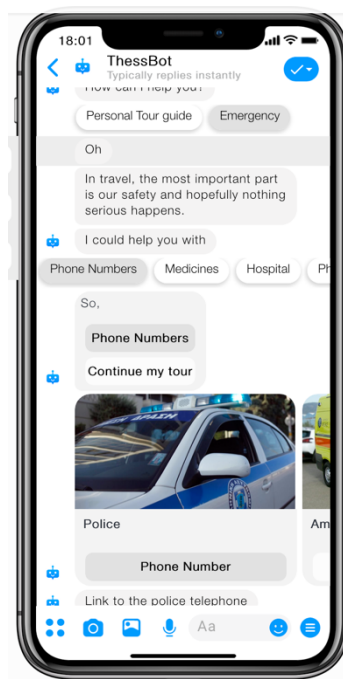
Text message:

- You can find hospitals on duty here
→ Link to the site providing appropriate information. → Continues by informing the user that the tour with the bot can be continued. → Link to the path that where the user selects between Personal tour guide and Emergency.

4. Pharmacy → If this category is selected, the bot informs the user about on duty pharmacies for the given day providing the appropriate link.

Text message:

- You can find pharmacies on duty here
→ Link to the site providing the appropriate information. → Continues by informing the user that the tour with the bot can be continued. → Link to the path that where the user selects between Personal tour guide and Emergency.



Picture 9: Emergency

If the user selects the Personal tour guide option, the bot continues as follows:

- Displays a text message informing the user about its intentions, stating that it wishes to help him during his visit. Additionally, the bot reminds the user of the ways that he can interact with it (the nature of the bot is clarified to the user).

Text message:

- Perfect, I'll be your personal tour guide and I hope to make your holidays easier and more enjoyable.
- But don't forget. I am a robot (robot emoji) and not yet that smart, so please use simple phrases or the buttons to interact with me.
- Asks the user if he is ready to start his tour and expects a simple YES or NO answer to proceed accordingly.

Text message:

- Do you want to start?
- If the answer is NO then the bot uses a polite farewell reply. It also links him with the path to the Personal tour guide and Emergency options. Essentially, it gives an option to the user for a fresh start.

Text message:

- Nice talking to you.
- If you need anything else, I am here for you.
- Link to the path Personal Tour Guide or Emergency.
- If the user's answer is YES, then the bot informs the user about the services it can provide.

The categories selected for this particular project are listed below.

Text message:

- I could help you with

Quick Replies: The bot offers its services in the form of quick replies.

1. Accommodation → If the user selects this category, the bot asks him to make a decision on accommodation categories based on budget. The options are given in the form of quick replies.

Text message:

- There are the categories based on your budget.

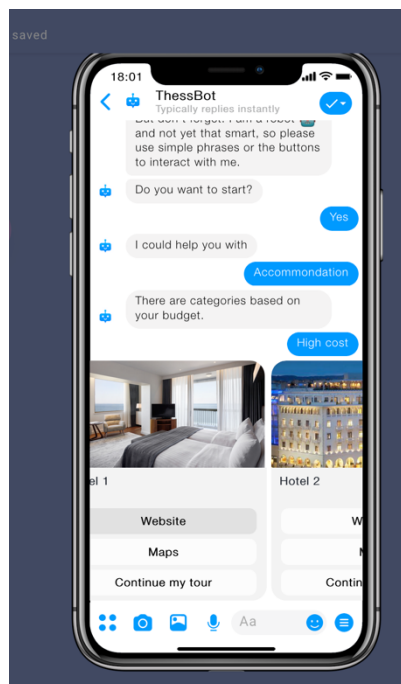
Quick Replies:

1. High Cost
2. Mid-Range
3. Low Cost

Whichever category the user selects, options and hotels will be presented accordingly in Carousel form.

Carousel:

- ◆ Hotel 1
 - Website → Link to the hotel's website.
 - Maps → Link to the hotel's Google Maps.
 - Continue my tour → If the user selects the Continue my tour option, he is linked with the Personal tour guide path result.
- ◆ Hotel 2 → Same process used for every hotel.



Picture 10: Accommodation

2. Eat and Drink → If the user selects this category, the bot asks him to choose between subcategories depending on what he wants on the given time. Choices are presented in the form of quick replies.

Text message:

- Are you searching for

Quick Replies:

1. Places to Eat → After selecting this category, the bot offers options between subcategories depending on the type of food the user wants at the given time, in Carousel form. Restaurants for each category are also presented in Carousel form.

Carousel:

- ♦ Restaurant type 1

1. Choice 1 - Restaurants

Carousel:

- Restaurant 1

- Details → Link to the restaurant's website
- Reservation → Link to the telephone of this restaurant
- Maps → Link to the restaurant's Google Maps

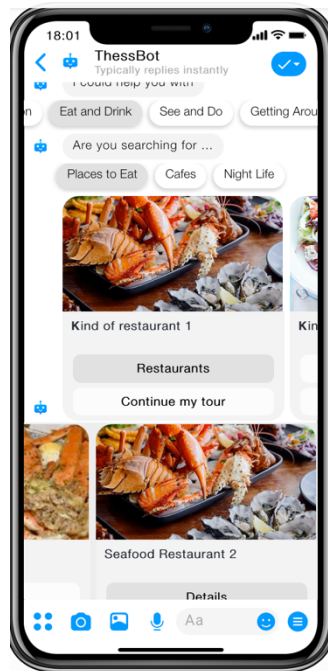
- Restaurant 2 → Same for every restaurant.

2. Choice 2 - Continue my tour → If the user selects the Continue my tour option, he is linked with the Personal tour guide path result.

- ♦ Restaurant type 2 → Same for each type of restaurant.

2. Cafes → Same structure as in restaurants.

3. Night Life → Same structure as in restaurants.



Picture 11: Eat and Drink

3. See and Do → After selecting this category, the bot makes a comment on the beauty and history of the city and offers options on subcategories depending on what the user wants at the given time. Options are given in the form of buttons.

Text Message:

- Thessaloniki has incredible beauty and history. What do you wish to do right now?

Buttons:

- ◆ Sights

- 1. Choice 1 – Restaurants

Carousel:

- Sight 1

- Details → Link to the sight's website
 - Tickets → Link to the sight's website - tickets
 - Maps → Link to the sight's google maps

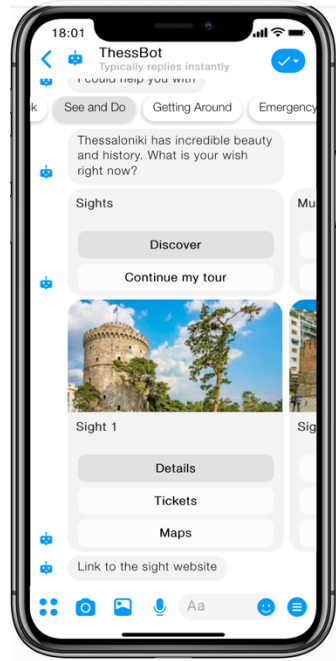
- Sight 2 → Same for each sight.

- 2. Choice 2 - Continue my tour → If the user selects the Continue my tour option, he is linked with the Personal tour guide path result.

- ◆ Museums → Same structure as sights.

- ◆ Events → Same structure as sights without adding the ticket subcategory.

- ◆ Guides Tours → Same structure as sights without adding the ticket subcategory.



Picture 12: See and Do

4. Getting Around → If the user selects this category the bot offers options on the different means of transportation available in the city. Answers are presented in the form of buttons.

Buttons:

1. Choice 1 – Getting Around

Quick replies:

1. Bus

Carousel:

- Website → Link to the website
- Bus Schedules → Link to the schedule on the website
- Intercity Bus → Link to the KTEL Makedonia website

2. Beat

Carousel:

- App Store → Link to the App Store
- Play Store → Link to the Play Store
- Details → Details for the Beat

3. E-scooter

Carousel:

- E-scooter 1
- App Store → Link to the app store
- Play Store → Link to the play store
- Details → Link to the e scooter 1 website
- E-scooter 2 → Same for each e-scooter.

4. Car Rental

Quick Replies:

1. Company 1 → Link to the company's website.
2. Company 2 → Same for each company.

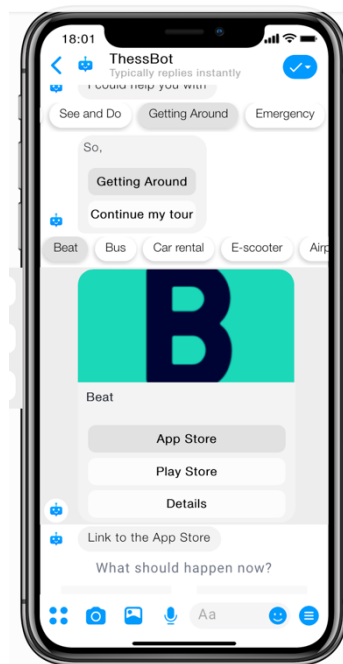
5. Airport Shuttle

Quick Replies:

1. Private

Quick Replies:

1. Company 1 → Link to the company's website
 2. Company 2 → Same for each company.
2. Public → Link to the bus schedule on the website
2. Choice 2 – Continue my tour → If the user selects the Continue my tour option, he is linked with the Personal tour guide path result.



Picture 13: Getting Around

5. Emergency → Link to the Emergency path result.

5 Evaluation and Conclusion

5.1 Summary

This dissertation presented the design for a chatbot – personal guide for Thessaloniki. The project's subject was the creation of a chatbot that will be utilized as personal guide for the user. Designing a chatbot is only one of many parts in completing the project. Based on the research that was conducted and following the decisions that were taken beforehand, the end result can be given to a specialized developer who can complete it. The intention behind this project was the creation of a chatbot that would serve as a useful tool for the traveler but also help promote Thessaloniki as a tourist destination. The goal was to develop a simple and straightforward bot that would include all the valuable information a traveler might need in order to make his trip as enjoyable as possible, without having to search for information in other sources. Concluding, the chatbot will be able to provide information on some of the most important aspects for the organization of a trip. Accommodation, Places to Eat and Drink, See and Do, Getting Around are four of the five categories included in the design. The fifth category involves traveler's safety which was also deemed important for inclusion.

ThessBot will be a chatbot for visitors to Thessaloniki, available 24/7 on the Facebook Messenger app. ThessBot's goal is to help users experience Thessaloniki in a unique way through a conversation with a local virtual friend who can give practical information, take visitors to the best local places and help them experience Thessaloniki like they would with a real local friend. With ThessBot, visitors have a virtual friend in their pocket.

5.2 Problems

During the completion of the project, certain issues were encountered.

5.2.1 BotSociety Issue

As mentioned previously, the BotSociety tool was used as a guide for the design. Despite the fact that the tool is well organized and straightforward at its use, a certain amount of time was needed in order to understand and learn its functions. Another issue at hand concerned the exportation of the flowchart that had to be included in the research, which was eventually added in the form of a screenshot.

5.2.2 Requirement analysis Issue

Additional issues that came up involved, mostly, the selection of appropriate functions for the chatbot. After consulting with the Enchatted company, we decided against the creation of a questionnaire. The company's suggestion was the conduction of research on existing chatbots and websites containing relevant information, hence overcoming our issue.

In conclusion, the issues encountered were not many and were dealt accordingly.

5.3 Future Work

The thesis' context was the design of a chatbot-personal guide for Thessaloniki. Further research and technical development are necessary in order to complete the project.

5.3.1 Evaluation

To begin with, at this point and time, the chatbot is at an early stage (design), rendering it unfit for evaluation. After handing the project to a specialized developer for the completion of the chatbot, several test runs need to be made in order to evaluate the bot and to receive appropriate feedback. This procedure will show whether the design is functionable or not. Moreover, it will show whether it is a practical tool that users will prefer over other sources of information, as well as evaluating whether some elements need to be added or withdrawn. Thus, before it is made available for

potential customers, we need to evaluate and create a chatbot that is well-fitting to the needs of its potential users.

5.3.2 Continuous improvement and training

It is well established that the chatbot designed for the context of the dissertation is not, quote on quote, smart. Meaning, it does not interact with the user by engaging in conversation, but by presenting simple options in different forms or answering Yes or No questions. In the basis of improving ThessBot, connecting it with APIs in order to make it a more intelligible interlocutor is suggested.

Keeping it up to date with the purpose of covering the needs and desires of its potential users is also of extreme importance. Constant observation of the users' needs is another important aspect that would help provide the chatbot with all the appropriate information.

5.3.3 Adding Categories

The feedback of the process of evaluation will help determine whether more categories must be included. The ThessBot is designed in such a way that any new entries to the project must have its own space without tiring or confusing the user.

An additional Feedback category can be included in the ThessBot that will allow every user to offer suggestions and input for the improvement of the bot, if deemed necessary. After analyzing the data, changes can be made to the bot. With the use of this category-function, the chatbot supervisor will be able to keep up with the needs and desires of its potential users.

5.3.4 Adding Platforms

Initially, the chatbot will be uploaded to the Messenger platform. Relevant research has shown that WhatsApp is another popular platform used in almost every mobile device. Expanding the bot to other platforms as well as implementing it in a popular website of Thessaloniki as an additional service, are some of the steps that can be taken in the process of improving the life of the visitors of the city.

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Appendix

Design Video

